No. 26 December 1, 1955

# FISH AND WILDLIFE MANAGEMENT REPORT

**PROVINCE OF ONTARIO**

**DEPARTMENT OF LANDS AND FORESTS**

**Division of Fish and Wildlife**

**Hon. Clare E. Mapledoram**
**Minister**

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(THESE REPORTS ARE FOR INTRA-DEPARTMENTAL INFORMATION AND NOT FOR PUBLICATION)

# SOME THOUGHT ON GAME LAWS

by
C. H. D. Clarke

Offences against game laws belong in the category of crimes created by Legislation. They are not comprehended in the Ten Commandments unless it be inferred that in the abuse and mishandling of our natural resources we fail in the respect due to the Creator and the consideration due to our neighbour, both being at the basis of moral law. Moral obloquy is no more attached to killing a deer than to butchering a pig. It is in fact to strengthen and perpetuate the moral right to wise use of both deer and pigs that the killing of the one and butchering of the other have been hedged about with certain restrictions. The drafting of game laws becomes as a result a matter to be thoroughly thought out, if officers are not to be left relying for support on an unsteady structure.

If the moral import of an offence created by our human assemblies is the least bit obscure, we may expect the law to fall into disrespect. This disrespect may spread to the rest of the statute of which it is a part. We can create a crime by law, but moral considerations must be present if it is to be enforceable. Furthermore, law must be specific, so that it is clear what offence has been committed, and conviction is possible only where it is clear that the offender intended to commit the specific offence. If, poor soul, he did not know it was an offence, that fact does not help him, but it might bring him much sympathy if the moral obloquy is more imaginary than real.

With these considerations let us look at a sample game law offence. Jack-lighting will do, as it is a reasonably thorny one. Jack-lighting in essence is simply an easy way to kill deer. Under pioneer conditions, when the natural increment of the deer herd was not being used, the settler who worked his land from dawn to dark had a good claim to the deer he was able to get quickly after dark. When pioneer conditions passed the deer were best used for sport. Often, though not invariably, the annual crop, though large, is not large enough to supply all those who wish to share in the harvest. Jack-lighting is not favoured by the deer-hunting fraternity at large, and its use puts an unfair advantage in the hands of the few. Under such circumstances it is resorted to by them more frequently as the difficulty of killing a deer by other methods increases. When it is illegal, the moral implications are clear. If, on the other hand, our deer

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were to increase in spite of hunting pressure until they were destroying their range and thus even injuring themselves indirectly, we might well withdraw our objections to jack-lighting where other forms of hunting failed to control the deer populations. However we can worry about that when it comes. Under parallel conditions we have already removed some restrictions on taking muskrats.

We now have jack-lighting of deer clearly encompassed within several offences, under terms which show it to be properly, and enforceably, so. Unfortunately, jack-lighters are not readily caught, and we have followed a precedent used in other cases and made the possession of jack-lighting paraphernalia where deer are found an offence in itself. Now we are on dangerous ground, something we should seriously consider, because we have made an offence of that which is not really an offence. Where we should be compelled to prove that the offender intended to kill deer, we are in law compelled only to prove that he intended to have with him, and did have, a gun, certain shells, and a light. Were the "agrets", as the old fur-trade men used to say, of jack-lighting such sinister things as the safe-cracker's nitroglycerine, and not to be found in the hands of honest men at large in the night, all would be well.

They are not, however, instead they are such as innocent men not only may have, but may be expected to have. Who owning a gun and finding himself far from home at dark does not go thither, taking his gun with him, and a light to show him the way; and if he be a fearful man, as some are, is he not likely to comfort himself by slipping in a cartridge? We well remember in far-away Yukon when our homeward path was scouted one snowy night by several wolves, now ahead, now behind or to one side, for several miles until they wearied and left. At the time we thought nothing of it, but had we been carrying a gun we should surely have loaded it anyway, and perhaps played up to the sportive pack, if for no other reason than to complete their lupine education. What would an officer do? And what gun or load cannot kill a deer?

Certainly the existence of a law purporting to deal with jack-lighting which makes offenders out of persons who had no thought of jack-lighting and removes from the officer the need of proving the intention of jack-lighting has to be used with care, unless it is to constitute a gross invasion of ordinary human rights. It has to be hedged about with clauses that reduce to a minimum the extent to which the innocent are made offenders and even then if it is ever used irresponsibly it crumbles and may cause the whole legal structure to fall out of alignment.

Under such circumstances is it fair to have a law which would compel officers to prosecute those who are morally innocent, as officers are given no discretionary powers? Evidently yes, because the most experienced officers assure us that they are comparatively helpless without it. It is clearly necessary to see the crime, the real moral issue, before taking action.

There is nothing in our laws and even in our humblest regulation that does not require the most searching analysis. Were everything in the field of game laws set out sharply in black and white, we should have no trouble. We find, however, that there is a great area of gray, and it is there that we often try to, and often must, draw our lines. Let us when we make our laws remember our responsibilities, both to the public and to the officer.

# BOTULISM RESEARCH AT THE NORMANDALE BIRD FARM, 1955.

by
S. W. Mound

Following unusually severe outbreaks of botulism in 1953, with losses in the holding pens of up to 80% of the young pheasant stock-birds, experiments continued into the influence of cover crops on botulism outbreaks. When no dead bird or other decaying animal carcass was discovered, it was felt that decaying vegetable matter might be solely responsible for producing the toxin. Amongst the vegetation planted in the pens, rape, widely used for game-bird forage, seemed the most obvious possible offender since its broad, cabbage-like leaves, close to the ground, create anaerobic conditions, hold moisture into the heat of the day, and rapidly break down in decay, especially the under leaves.

In 1954, when one pen was sown to include rape and the three others only oats, rye and sunflower seed, botulism occurred only in the pen containing rape. Fifty-three birds died in forty-eight hours following the first signs of the paralysis symptoms. Most of the cover was immediately removed from the pen (to include all the rape) and the outbreak was brought under control. No further outbreak occurred throughout the season in any pen.

In 1955, no holding pen was planted to include rape (or any other broad-leaved, low-growing,plant). Although weather conditions during the season were considered quite conducive to botulism, no single case has occurred. This is not to say that rape should be avoided as cover and feed. Second-year rape is a different matter as in its second year the plant grows tall, flowers in mid-summer, and goes to seed. On the rearing field therefore it is excellent when planted the previous fall. The young birds take advantage of the adequate succulent green-feed during the spring months. By the hot weather, however, the plants have grown tall and gone to seed. Now the young birds can feed voraciously on the small, black seeds, stripping the pods clean. As game-bird feed and cover, then, rape is highly recommended for second year cropping when planted the previous fall in combination with clover and grasses. It is not recommended for pasturing the same year as planting, under climate conditions existing in Southern Ontario, due to the nature of its growth, already mentioned, and the fact that this may, in turn, lead to the producing of botulinous toxins on the range, or in the pen, with disastrous results.

# DUCK BANDING - TORONTO ISLANDS - 1955.

by
W. J. D. Stephen and John Goddard

The duck banding programme on Toronto Islands, initiated in 1954 by the Department of Entomology and Zoology, Ontario Agricultural College and sponsored by the Toronto Anglers' and Hunters' Association, was continued in 1955 under the same auspices. Four recoveries from the 1954 banding programme have been acknowledged by the U. S. Department of the Interior, Fish and Wildlife Service.

These are:

547-25950 - Mallard ♂ (banded when adult), recovered Lagoon at Toronto Bay, south of Toronto, about June 6, 1955.

547-25955 - Mallard ♀ (banded when adult), recovered Scarboro, York County East, Ontario, about November 2, 1954.

547-25986 - Black ♀ (banded when adult), recovered at beach at Hanlan's Point, Toronto, Ontario, May 24, 1955.

547-25995 - Mallard ♀ (banded when adult), recovered on Lake Nipissing, North Bay, Nipissing District, Oct. 23, 1954.

Other ducks banded in 1954 at Toronto Islands and recovered during this banding operation were:

547-24909 - Black ♀ (banded when adult), Toronto Islands 1955, caught in duck trap, released alive.

547-24933 - Mallard ♀ (banded when adult), Toronto Islands 1955, caught in duck trap, released alive.

A total of 138 ducks were banded on the Islands during the trapping period which lasted from June 9 to 29.

According to Age, Sex and Species, these are tabled as follows:

| Species | ♂♂ | ♀♀ | Not Sexed | Juveniles | Adults |
|---|---|---|---|---|---|
| Anas platyrhynchos platyrhynchos | 7 | 14 | 86 | 86 | 21 |
| Anas rubripes | 0 | 8 | 23 | 23 | 8 |

The total population in July 1955, based on spot counts and extrapolated to known duck concentrations, was estimated at 450 plus or minus 50 ducks.

| | | |
|---|---|---|
| This figure consisted of | ♂♂ Mallards | 200 |
| | ♀♀ Mallards | 140 |
| | ♂♂ Black | 60 |
| | ♀♀ Black | 50 |
| | | 450 |

The ratio of Mallards to Blacks at this time was estimated at 4:1.

The total population in July 1954, based on counts of known duck concentrations and with allowances for ducks in eclipse plumage which may not have been seen was:

| | |
|---|---|
| Adults | 200 to 225 |
| Juveniles | 175 to 200 |
| Total | 375 to 425; or 400 plus or minus 25. |

The only information on the ratio of Mallards to Blacks collected in 1954 was that of the ducks banded, which was approximately 5 to 2. However this ratio was not necessarily the population ratio.

It was noted during the banding programme that there was a high incidence of apparently unmated non-nesting female Mallards, and also a similarly high population of non-breeding pairs, that is, pairs which are still in the company of each other with the males in full breeding plumage.

No estimate was made of the number of broods in 1955 but there seemed to be approximately the same number of broods as in 1954, or, in other words, 36 broods.

A survey was made of brood size, the results of which are shown in the table. The most commonly occurring brood size was five ducklings. This survey of the brood size was made when the ducklings were at early Class II.

| Number of broods of | Number of Ducklings Per Brood | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Mallards | 2 | 1 | 3 | 2 | 8 | 7 | 0 | 2 | 0 | 2 |
| Blacks | 1 | 0 | 1 | 3 | 3 | 1 | 0 | 0 | 0 | 0 |
| Total | 3 | 1 | 4 | 5 | 11 | 8 | 0 | 2 | 0 | 2 |

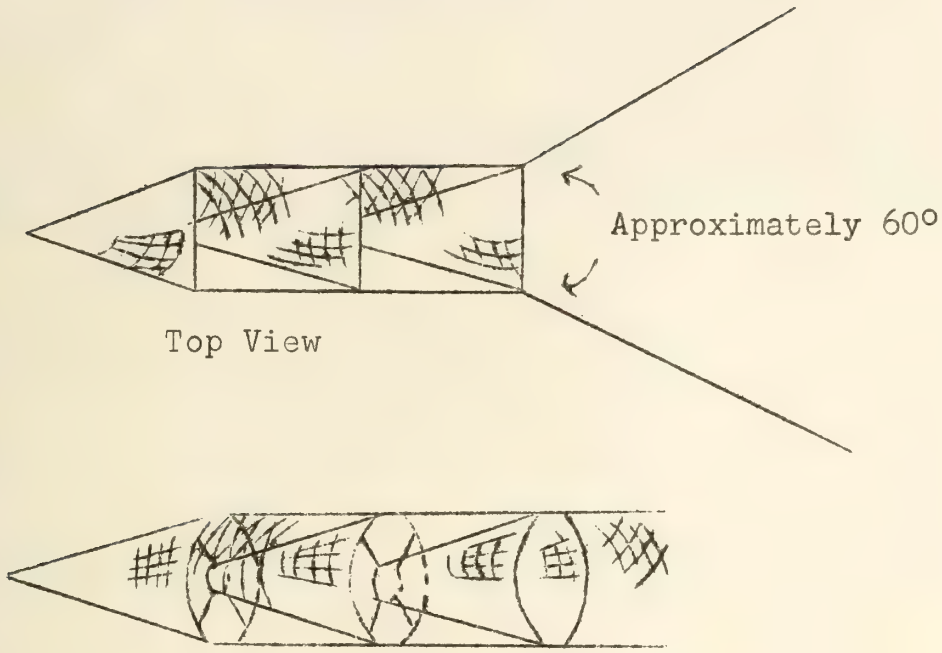
There were several recaptures, these are as follows:

547-24968 - Juvenile Mallard - recaptured four times.
547-24970 - Juvenile Mallard - recaptured four times.
547-24965 - Juvenile Mallard - recaptured three times.
547-24967 - Juvenile Mallard - recaptured three times.
547-24966 - Juvenile Mallard - recaptured two times.
547-24992 - Juvenile Black - (found dead in trap)
547-33509 - Juvenile Black
547-33510 - Juvenile Black

Total recaptures - 19
% recaptures - $\frac{19}{138} = 14\%$

During the programme, there were 36 ducklings of class I which were released as too small to band. Ten ducks were found dead in traps, some of these doubtless lost to predators, others were killed trying to escape.

Three types of traps were used. These were 4' x 4' x 8', 3/4" chicken-wire over wooden frame, and 6' x 6' x 4', 4" x 2" mesh welded wire, both of which types are collapsible, and covered with 1" fish seine. The third type trap was a hoop net, which was used to capture the ducks after they were driven into the hoops. The hoop net used was one with four foot hoops, 12 foot wings and a 75 foot centre lead. Originally designed as a fish trap, the hoop net was converted to a duck trap by removing the centre lead which was cut into two lengths and attached to the original wings. This device was used effectively when tied on shore with the wings and front hoops in the water, or with the end of the hoops tied to a bridge or some other object to that it was suspended with most of the net above water (so that the bottom of the narrow end of the first cone net is above water). The wings are extended so that they touch each side of a restricted water passage such as a narrow channel or bay. If the net is being used when tied on the edge of a water area too wide for the wings to span, then the wings should be extended at an angle of approximately 60°. Natural obstacles such as trees should be utilized for suspending the wings of the net.




Oblique Side View with Near Wing Removed.

Ducks are herded into the net by using a boat powered by an outboard motor. If herded slowly so that they do not become too nervous it is quite easy to direct their movement into the hoop net. Once inside the wings, more severe herding pressure can be used. The ducklings do not attempt to go through the netting of the wings or climb over but move along and into the hoops. Black ducks are more easily excited than Mallards. Both species, especially the female parents, seem averse to move from their "home range", where they normally feed, preen and sun themselves. Thus it is more convenient sometimes to move the net rather than attempt to herd a family of ducks too far from the area where they are seen most frequently.

The hoop net was used to capture 60.5% of the juveniles, the bait traps were responsible for the other 39.5%. Of the adults, 31.0% were caught in the hoop net, 69% were caught in bait traps.

It is recommended that in next year's programme
1) Whole corn be used alone for bait.
2) The banding operation commence between June 16 and 19 in 1956. The weather this year could be considered normal, thus an adjustment in this schedule could be made for an abnormal spring.

3) Collapsible welded wire traps, 2" x 4" mesh, be used as they are more convenient, and apparently equally efficient.

4) More publicity be given the programme on Toronto Islands in order to avoid, if possible, friction with Island residents and alleviate the problem of righteous-minded individuals releasing ducks from traps.

# WATERFOWL BAND RECOVERY PROGRAM, SIOUX LOOKOUT DISTRICT, PROGRESS REPORT, MARCH 24, 1954 - JULY 31, 1955

by
A. T. Cringan

We have added 63 completed band returns to our files since the last progress report was written on March 24th., 1954.* This increases the number of such returns to 234. Returns by species are shown in Table I.

TABLE I - District Band Returns by Species.

| Species | Returns Received up Until March 23, 1954 | Returns Received March 23, 1954 to July 31, 1955 | Total |
|---|---|---|---|
| Canada Goose | 68 | 23 | 91 |
| Mallard | 41 | 14 | 55 |
| Black Duck | 23 | 10 | 33 |
| Lesser Snow Goose | 13 | 7 | 20 |
| Blue Goose | 13 | 4 | 17 |
| Pintail | 5 | 2 | 7 |
| Lesser Scaup Duck | 3 | 1 | 4 |
| Richardson's Goose | 2 | 1 | 3 |
| Ring-necked Duck | 1 | | 1 |
| Redhead | 1 | | 1 |
| Green-winged Teal | 1 | | 1 |
| Baldpate | | 1 | 1 |
| TOTAL | 171 | 63 | 234 |

Of the 63 bands for which new returns have been received, 21 may be regarded as "old" returns. These were received from one person, and had been collected over a 10-year period.

## Source of Returns

Places of returns, by band areas and species, are given in Table II. As previously, Severn and Winisk continue to be the main sources of band recoveries.

* See Fish and Wildlife Management Report No. 20, December, 1954.

TABLE II - Places of Returns, by Species

| Band Area | CG | M | BD | LSG | BG | P | LSD | RG | RND | R | GWT | B | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Severn | 22 | 3 | 4 | 17 | 11 | 2 | | 3 | | | | | 62 |
| Winisk | 28 | | 7 | 2 | 5 | 1 | | | | | | | 43 |
| Bearskin Lake | 3 | 4 | 1 | | | 1 | | | | | 1 | | 10 |
| Kasabonika | 2 | | 1 | | | | | | | | | | 3 |
| Island Lake | 1 | 4 | | | | 1 | | | | | | | 6 |
| Deer Lake | 1 | 2 | | | | | 1 | | | | | | 4 |
| Sandy Lake | | 6 | | | | | | | | | | | 6 |
| Round Lake | 3 | 3 | 1 | | | | | | | | | | 7 |
| Big Beaverhouse | 2 | 2 | | | | | | | | | | | 4 |
| Lansdowne | 2 | 4 | 1 | | | | | | | | | | 7 |
| Little Grand Rapid | | 1 | | | | | | | | | | | 1 |
| Cat Lake | 4 | 10 | 2 | | | 1 | 1 | | 1 | | | | 19 |
| Pickle Lake | 2 | | 1 | | | | | | | | | | 3 |
| Osnaburgh | 1 | 1 | | | | | | | | | | | 2 |
| Fort Hope | 2 | | | 1 | | | | | | | | | 3 |
| Ogoki | 2 | 2 | 3 | | | | | | | | | | 7 |
| Grassy Narrows | | 1 | | | | | | | | 1 | | | 2 |
| Lac Seul | | 4 | | | | | | | | | | | 4 |
| SL - Armstrong | | 7 | 5 | | | | 1 | | | | | | 13 |
| Auden - Nakina | | | | | | | 1 | | | | | | 1 |
| Sudbury | | | 1 | | | | | | | | | | 1 |
| Patricia East | 16 | | 6 | | 1 | 1 | | | | | | | 24 |
| Pekangikum | | 1 | | | | | | | | | | 1 | 2 |
| TOTAL | 91 | 55 | 33 | 20 | 17 | 7 | 4 | 3 | 1 | 1 | 1 | 1 | 234 |

## Means of Death of Banded Waterfowl

Means of death of these 234 birds are summarized in Table III. Nine out of the 63 new recoveries, or 14%, were reported as taken from birds which had been accidentally trapped.

TABLE III - Means of Death of Banded Waterfowl

| | CG | M | BD | LSG | BG | P | LSD | RG | RND | R | GWT | B | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shot, April-May | 49 | 28 | 11 | 1 | | 4 | 2 | 1 | | | 1 | | 97 |
| Shot, June-Aug. | 8 | 3 | 7 | | 1 | 1 | 1 | | | | | | 21 |
| Shot, Sept. - Nov. | 12 | 2 | 6 | | 15 | | | 2 | | 1 | | | 57 |
| Trapped | 2 | 14 | 3 | 19 | | | 1 | | | | | 1 | 21 |
| Not known or other | 20 | 8 | 6 | | 1 | 2 | | | 1 | | | | 38 |
| TOTAL | 91 | 55 | 33 | 20 | 17 | 7 | 4 | 3 | 1 | 1 | 1 | 1 | 234 |
| Means of death known | 71 | 47 | 27 | 20 | 16 | 5 | 4 | 3 | | 1 | 1 | 1 | 196 |
| Percent trapped | 3% | 30% | 11% | | | | 25% | | | | | 100% | 11% |

## Place of Banding

States or provinces in which the recovered birds were originally banded are summarized in Table IV.

TABLE IV - Places of Banding, by Species

| Province or State | CG | M | BD | LSG | BG | P | LSD | RG | RND | R | GWT | B | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. W. Territories | | | | 20 | 14 | | | | | | | | 34 |
| Saskatchewan | | | | | | 1 | | | | | 1 | | 2 |
| Manitoba | | 5 | | | | 1 | | | | 1 | | 1 | 8 |
| Ontario | 7 | | | | | | | | | | | | 7 |
| Colorado | | 1 | | | | | | | | | | | 1 |
| North Dakota | | 1 | | | | | | | | | | | 1 |
| South Dakota | | 2 | | | | | | 3 | | | | | 5 |
| Minnesota | | 4 | | | | | | | | | | | 4 |
| Wisconsin | 15 | 1 | 1 | | 1 | | | | | | | | 18 |
| Missouri | 17 | 1 | | | 2 | | | | | | | | 20 |
| Michigan | | 3 | 9 | | | 1 | 4 | | | | | | 17 |
| Illinois | 52 | 16 | 9 | | | | | | | | | | 77 |
| Indiana | | 2 | 3 | | | | | | | | | | 5 |
| Ohio | | 4 | 2 | | | | | | | | | | 6 |
| Pennsylvania | | 3 | 6 | | | | | | | | | | 9 |
| New York | | 3 | 2 | | | | | | | | | | 5 |
| California | | | | | | 1 | | | | | | | 1 |
| Oklahoma | | 1 | | | | | | | | | | | 1 |
| Alabama | | 2 | | | | | | | | | | | 2 |
| Tennessee | | 3 | | | | | | | | | | | 3 |
| Kentucky | | | 1 | | | | | | | | | | 1 |
| Louisiana | | 1 | | | | 1 | | | 1 | | | | 3 |
| Nebraska | | 1 | | | | | | | | | | | 1 |
| Maryland | | 1 | | | | 1 | | | | | | | 2 |
| Florida | | | | | | 1 | | | | | | | 1 |
| TOTAL | 91 | 55 | 33 | 20 | 17 | 7 | 4 | 3 | 1 | 1 | 1 | 1 | 234 |

# WATERFOWL HUNTERS' BAG CHECKS

## TWEED DISTRICT, 1955

by
P. A. Thompson

On September 17th, the opening day of the waterfowl season, a check was made on duck hunters in various parts of the Tweed District. The primary purpose of this check was to obtain figures on hunters' success and composition of the kill.

As Tweed District contains two major types of duck habitat (1) South of the Pre-Cambrian Shield in rich fertile cattail marshes. (2) On the Pre-Cambrian Shield in beaver ponds and sedge marshes, information was collected and compiled separately.

The data collected from the various checks are summarized in the following table:

Off the Pre-Cambrian Shield

| Marsh | Date | Hunters | Bag | Cripples | Average Bag |
|---|---|---|---|---|---|
| West Lake | Sept. 17 | 93 | 102 | 64 | 1.1 |
| Camden Twp. | Sept. 17 | 54 | 152 | 20 | 2.8 |
| Portland Twp. | Sept. 17 | 6 | 25 | 2 | 4.1 |
| Huff Island | Sept. 17 | 53 | 225 | 56 | 4.2 |
| Amherst Island | Sept. 17 | 78 | 303 | 71 | 4.2 |
| Hay Bay | Sept. 17 | 17 | 57 | 14 | 3.3 |
| Crow Lake | Sept. 17 | 41 | 73 | 5 | 1.8 |
| Wolfe Island | Sept. 17 | 63 | 276 | 28 | 4.4 |
| TOTALS | | 405 | 1213 | 260 | 3.0 |

On the Pre-Cambrian Shield

| Marsh | Date | Hunters | Bag | Cripples | Average Bag |
|---|---|---|---|---|---|
| Conroy Marsh | Sept. 17 | 40 | 43 | 18 | 1.0 |
| Dwyers Marsh | Sept. 17 | 6 | 4 | 4 | .6 |
| Mississippi | Sept. 17 | 30 | 28 | 3 | .9 |
| Calabogie Lake | Sept. 17 | 57 | 72 | 39 | 1.3 |
| Bobs Lake | Sept. 17 | 28 | 13 | 8 | .4 |
| TOTAL | | 161 | 160 | 72 | 1.0 |

The admitted number of ducks lost through crippling amounted to 21% of the kill off the Pre-Cambrian Shield and 45% on the Pre-Cambrian Shield.

Summary figures of the bag check for 1954 and 1955 are given, for comparison, in the following tables:

Off the Pre-Cambrian Shield

| Year | Hunters | Bag | Cripples | % Cripples Lost | Average Bag |
|---|---|---|---|---|---|
| 1954 | 298 | 921 | 192 | 21% | 3.1 |
| 1955 | 405 | 1213 | 260 | 21% | 3.0 |

On the Pre-Cambrian Shield

| Year | Hunters | Bag | Cripples | % Cripples Lost | Average Bag |
|---|---|---|---|---|---|
| 1954 | 167 | 134 | 45 | 34% | .8 |
| 1955 | 161 | 160 | 72 | 45% | 1.0 |

The species composition of the bags checked is summarized in the following table:

| | Off the Shield | | On the Shield | |
|---|---|---|---|---|
| Species | Number | Percent | Number | Percent |
| Mallard | 156 | 12.9 | 7 | 4.4 |
| Black Duck | 324 | 26.9 | 28 | 17.5 |
| Wood Duck | 68 | 5.6 | 39 | 24.4 |
| Blue-winged Teal | 509 | 42.2 | 23 | 14.4 |
| Green-winged Teal | 121 | 10.3 | 1 | .6 |
| Pintail | 2 | .1 | 0 | 0 |
| Scaup & Ring-necked Duck | 13 | 1.0 | 41 | 25.6 |
| Shoveller | 2 | .1 | 0 | 0 |
| Merganser | 11 | .9 | 21 | 13.1 |
| TOTAL | 1206 | 100 % | 160 | 100 % |

The wood duck again formed an important part of the kill on the Pre-Cambrian Shield placing second to scaup and ring-necked ducks combined.

Hunters checked on Huff Island were asked how the number of ducks in flight this season compared to that of last season. 52% reported more, 31% the same, and 17% less.

The unseasonable weather with 80° temperatures on opening day brought many complaints of ducks spoiling from hunters in the southern marshes.

It has long been felt that a later opening date of the duck season would provide more protection for local breeding ducks. As the average bag of the 1955 check compares favourably with that of the 1954 check, perhaps this added protection is not necessary. Therefore, may it be suggested that the present method of collecting information be continued for one or two years before any adjustments are made in the seasons.

# LITTER SIZE OF FISHER IN THE PATRICIAS, 1955.

by
H. G. Lumsden

At the spring trappers meetings in parts of Patricia West and Central, the opportunity was taken to collect information from the Indians on litter size of fisher.

During the discussion period at each meeting the trappers were asked if they had ever found a fisher's den containing young, the number of young present and the approximate date of finding.

All the reports refer to Ontario although some of the trappers live in the summer and were interviewed in Manitoba.

The following table indicates that litter size ranges from 2 to 7 and averages about 3.4 young in this area. Many of the trappers could not give a date when the litters were found, however the times given by those who were able to do so indicate that birth occurs in late April or about breakup time. Nearly all reported finding the young in a standing hollow tree.

| Place | Trapper | Litter Size | Time Found |
|---|---|---|---|
| Pikangekum | Abraham Keeper | 4 | Just after breakup |
| | George Strang | 2 | May 2, 1955 |
| Deer Lake | Philip Kakamik | 4 | - |
| Sandy Lake | John Kakagemik | 3 | - |
| | George Kakagemik | 4 | - |
| Round Lake | Joe Quequish | 3 | - |
| Bearskin | Isaac Barkman | 3 | - |
| | Isiah Tait | 4 | - |
| | Gilbert Thunder | 7 | - |
| | Simeon Fox | 2 | - |
| Landsdowne | Coaster Wabasse | 2 | - |
| | Coaster Wabasse | 3 | - |
| Meminiska | Edward Nete | 3 | - |
| Osnaburgh | Peter Shawanamarsh | 4 | - |
| Red Sucker Lake | David McDougall | 3 | Late April |
| Island Lake | Edward Flette | 3) | Late April before |
| | John Flette | 3) | the snow had gone. |
| Maria Portage | John Mason | 3 | Mid May |

The following pregnant females were reported:

| | | | |
|---|---|---|---|
| Deer Lake | John Meekis | 5 embryos | - |
| | Sam Meekis | 3 embryos | - |

TOTAL: 18 litters containing 60 young fisher.
2 pregnant females with 8 young.

Average litter size: 3.4 young.

# SMALL MAMMAL TRAPPING

## PUSLINCH TOWNSHIP, WELLINGTON COUNTY, 1953.

by
A. deVos

Small mammal trapping was carried out on a small scale in Puslinch Township, Wellington County, in an area situated about 7 miles southeast of O.A.C. Recently reforested land, or land to be reforested was selected for censusing, as little is known about male mammal populations in such areas. The trapping was done under my supervision by students Merriam and McHardy.

Trap lines are permanently marked by stakes, and it is hoped that these lines may be trapped during a number of years. Snap-trap lines are laid out according to the prescription of the North American Census of Small Mammals: twenty stations are established in a straight line with a distance of 50 ft. The radius of each trapping station is 2.5 ft. Within the limits of each trapping station three traps capture the small mammals occurring there. These traplines are laid out in pairs, parallel to each other, 400 feet apart.

Snap-trap lines I and II were established on the de Vos farm in a pastured woodlot, where only a scattered stand of beech and maple survives. There is some second growth of ironwood. This woodlot will be fenced and reforested. It is possible that snap-trapping in this habitat over a period of years may show a change in the ratio of numbers of individuals in the various species and of species of small mammals present. Table I shows trapping result obtained. Trapping took place in May and August, Peromyscus leucopus noveboracensis was the only species trapped, which was to be expected in this habitat.

Two other snap-traplines, III and IV, were laid out in a Wellington County Forest, a deserted farm which was reforested during the springs of 1952 and this year. When this plantation grows up, changes are likely to occur in the small mammal population. The habitat is partially hilly, and partially flat, wet ground, adjoining a willow-swale. Before reforestation took place this was poor permanent pasture. The majority of the small mammals were trapped on the hilly part of the trapline. Table II shows results obtained. Trapping took place in one monthly intervals in May, June, July and August. The following small mammals were trapped (see Table II):

| | |
|---|---|
| 17 | Peromyscus maniculatus bairdii |
| 1 | Peromyscus leucopus noveboracensis |
| 6 | Zapus hudsonius |
| 1 | Microtus pennsylvanicus |
| 1 | Tamias striatus |
| 1 | Small mammal unidentified (one foot) |
| 5 | Peromyscus unidentified |

The catch indicates relatively high populations of P.m. bairdii and Zapus hudsonius: a low population of M. pennsylvanicus.

Live trapping small mammals in box traps, which have one galvanized iron drop door released by a tradle, was also undertaken in the same County Forest, as well as in an adjoining deserted farm. Again, two linear traplines (#V and VI) were laid out of 30 stations each. The distance between stations is 100', between traplines 200'. Each trapline is situated 100' from the fence separating the County Forest from the deserted farm. Half-way between stations, pails were dug into the ground to trap additional small mammals. The habitat is very similar for both traplines with the exception that the County Forest was implanted with white spruce, white pine, and scotch pine in the spring of 1952.

Tables III and IV show the results of live trapping obtained at one-monthly intervals in May, June, July, August and October. Most small mammals were toe-clipped, and released again, in an endeavour to record their movements and the numbers retrapped. On trapline V five individuals were retrapped. Maximum movement 400'. On trapline VI four specimens were retrapped, among which one which had moved from station 8 of trapline V to station 1 of trapline VI during an interval of 2 months. This record indicates that traplines V and VI are located too close to each other and too close to the boundary of their habitat. As it was too difficult for untrained students to recognize the various small mammal species in the field, no information is available about the specific status of the Peromyscus which were released alive. Only the ones found dead in traps, or killed in the process of handling were keyed out.

Table V shows the catch breakdown:

TABLE V - Catch of Traplines V and VI.

| Trapline V (County Forest) | Trapline VI (Deserted Farm) |
|---|---|
| A. In box traps | |
| 15 Peromyscus | 8 Peromyscus |
| 23 Peromyscus m. bairdii | 6 Peromyscus m. bairdii |
| 1 Zapus hudsonius | 2 Blarina brevicauda |
| 5 Tamias striatus | 3 Zapus hudsonius |
| | 1 Tamias striatus |
| | 3 Microtus pennsylvanicus |
| B. In pails | |
| 1 Microtus pennsylvanicus | 1 Microtus pennsylvanicus |
| 1 Zapus hudsonius | 1 Zapus hudsonius |
| | 2 Sorex cinereus |

Results indicate that the catch in pails certainly differs greatly from the catch in live traps. Although a combination between live traps and pails may produce a good sample of the actual population of small mammals present, this trapping system is not satisfactory, as practically all animals caught in the buckets were found to be dead. Live trapping is only successful if done on a large scale and by trained personnel. In that respect the venture was not too successful.

Measurements were taken in the Wellington County Forest of the height of various tree species present, in order to get a quantitative figure on changes in the vegetation. The following measurements were taken along trapline V:

| Tree Species | Stake No. | No. of Trees | Average Length (inches) |
|---|---|---|---|
| white spruce | 6 | 12 | 8.6 |
| white spruce | 12 | 12 | 9.1 |
| white spruce | 18 | 12 | 9.1 |
| willow | 15 | 12 | 51.1 |
| poplar | 6 | 12 | 50.3 |
| ash | 4 | 12 | 7.7 |

Pictures were taken of the habitat from stake #30 in a northerly direction, from stake #5 to the east, and from stake #14 to the northeast.

To summarize, it was found that relative high populations of Peromyscus m. bairdii and Zapus hudsonius occurred in a tract of land reforested in 1952 and 1953, and low numbers of Microtus pennsylvanicus. A pastured

woodlot with a scattered mature stand of beech and maple produced only Peromyscus l. noveboracensis.

Plans for 1954

1. It is suggested: that trapping on Traplines I, II, III and IV be continued on the same basis.

2. that live trapping be discontinued on traplines V and VI, and that these lines be snap-trapped instead. These lines should be changed, so that each is 200' from the fence separating the reforested area from the deserted farm.

3. that two additional snap-traplines be operated at the same time in another County Forest in Halton County (conc. II, lot 17).

TABLE I - Snap-traplines I and II (lot 14, conc. IX, Puslinch Township).

| | Trapline I | | Trapline II | |
|---|---|---|---|---|
| Stations | May 4-6 | Aug. 18-20 | May 4-6 | Aug. 18-20 |
| 1 | | | | 1 Per. l.n. |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | 1 Per.? | 1 Per. l.n.* | | |
| 6 | | | | |
| 7 | | 1 Per. l.n. | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | 2 Per. l.n. |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |
| 18 | 1 Per.? | 1 Per.? | | |
| 19 | | | | |
| 20 | | | | |

* Peromyscus leucopus noveboracensis

TABLE II - Snap-traplines III and IV (Wellington County Forest Crawford Tract, lot 14, conc. X, Puslinch Township)

| Stations | May 7-9 | June 15-17 | July 14-16 | Aug. 18-20 | May 7-9 | June 15-17 | July 14-16 | Aug. 18-20 |
|---|---|---|---|---|---|---|---|---|
| 1 | | 1 Z.h.[3] | | 1 Z.h. | | | | |
| 2 | | | 1 T.s.[4] | | | | | |
| 3 | | | | | | | | |
| 4 | | 1 Z.h. | | | | | 1 P.m.b. | |
| 5 | | 1 Z.h. | | | | | 3 P.m.b. | |
| 6 | 1 M.p.[1] | | | | | 1 P.m.b. | | |
| 7 | | | | | | | | |
| 8 | | | | | 1 P.m.b. | 1 P.m.b. | | |
| 9 | | 1 Z.h. | | | | 1 P. ? | | |
| 10 | | | | | | | | |
| 11 | | 2 P.m.b. | | | | 1 P.m.b. | 1 P. ? | 1 P.m.b. |
| 12 | | | | | | | 1 P.m.b. | 1 S.m.? [6] |
| 13 | | | 1 P.l.n.[5] | | | | | |
| 14 | 2 P.? | | | | | | | |
| 15 | 1 P.m.b.[2] | 1 P.? | | 1 Z.h. | | | | |
| 16 | | | | | | | | |
| 17 | | 1 P.m.b. | | | | | | |
| 18 | | 1 P.m.b. | | | | | | |
| 19 | | | | | | | | |
| 20 | | 2 P.m.b. | | | | | | |

1 Microtus pennsylvanicus
2 Peromyscus maniculatus bairdii
3 Zapus hudsonius
4 Tamias striatus
5 Peromyscus leucopus noveboracensis
6 Small mammal unidentified

TABLE III - Live-trapline V (Wellington County Forest, lot 14, conc. X, Puslinch Township.)

| Stations | May 21-23 | June 15-17 | July 14-16 | Aug. 18-20 | Oct. 2-7 |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | 1 P.m.b. | | 1 P.m.b. |
| 3 | | | 1 P.m.b. | | |
| 4 | | | 1 P.m.b. | | 1 P.m.b. |
| | | | | | 1 Per.? |
| 5 | | 1 Zap.h. | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | 2 P.m.b. | | 1 P.? | 1 P.m.b. |
| 9 | | | | | |
| 10 | | | 2 P.m.b. | | 1 P.m.b. |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | 1 M.p. (pail) | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | 2 P.m.b. | | | |
| 17 | | | | | |
| 18 | | 2 P.m.b. | | | |
| 19 | | 2 P.m.b. | 1 P.m.b. | 2 P.? | |
| 20 | | 1 P.m.b. | | 2 P. | |
| 21 | | 2 P.m.b. | | | |
| 22 | | 1 P.m.b. | 1 T.s. | | 1 P.m.b. |
| 23 | 1 Z.h.[1] (pail) | | | 1 P.? 1 T.s. | 1 T.s. |
| 24 | | 1 T.s. | | | |
| 25 | | | | | |
| 26 | | | | | 1 P.? |
| 27 | | | | | |
| 28 | | 1 P.m.b. | | | 1 P.? |
| | | | | | 1 P.m.b. |
| 29 | | | | | 1 P.m.b. |
| 30 | | | | | |

1 For abbreviations, see Table II.

TABLE IV - Live-trapline VI (Deserted farm, lot 15, conc. X, Puslinch Township).

| Stations | May 21-23 | June 15-17 | July 14-16 | Aug. 18-20 | Oct. 2-4 |
|---|---|---|---|---|---|
| 1 | | | 1 P.m.b. | | |
| 2 | 1 M.p., L.p.? | | 1 P.m.b. | 1 P.? | |
| 3 | | | 1 P.m.b. | | |
| 4 | | 1 Z.h. | | | 1 P.m.b. |
| 5 | | | | | |
| 6 | 1 M.p. (pail) | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | 1 P.m.b. | | | |
| 12 | | | | | |
| 13 | | 3 Z.h. (pail) | | 1 S.c.[2](pail) | |
| 14 | | 2 Z.h. (") | | | |
| 15 | | 2 Z.h. (") | | | 1 B.b.[3] |
| 16 | | | | | |
| 17 | | | | | 1 P.? |
| 18 | 1 Z.h. | 1 P.m.b. | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | 1 P.? |
| 22 | | | | | |
| 23 | | | 1 P.m.b. | 1 P.? | |
| 24 | | | | 1 T.s. | |
| 25 | | | | | |
| 26 | | 1 Z.h. | | | |
| 27 | | | | | 1 P.? (under pail) |
| 28 | | | | | |
| 29 | | | | | 1 P.? |
| 30 | | | | | |

1 For abbreviations, see Table II.
2 Sorex cinereus
3 Blarina brevicauda kirtlandi

TABLE V - Data on Individuals Caught

| Date | Species | Location | Sex | Weight (gms.) | Total Length (mm.) | Tail | Hind Foot | Ear | Age |
|---|---|---|---|---|---|---|---|---|---|
| May 5 | P.? | I - s | ♂ | 24.9 | 178 | 79 | 21 | 16 | ad. |
| May 6 | ? | I - 18 | ? | 22.9 | 167 | 73 | 19 | 17 | ? |
| Aug. 19 | P.l.n. | I - 7 | ♀ | | 176 | 79 | 20 | 18 | ad. |
| Aug. 20 | P.l.n. | I - 5 | ♂ | | 170 | 73 | 20 | 18 | ad. |
| Aug. 19 | P.l.n. | II - 1 | ♀ | | 170 | 76 | 19 | 17 | ad. |
| Aug. 19 | P.l.n. | II - 10 | ♂ | | 163 | 73 | 19 | 15 | ad. |
| Aug. 20 | P.l.n. | II - 10 | ♀ | | 164 | 76 | 20 | 14 | ad. |
| May 8 | P.? | III - 14 | ? | | | | | | |
| May 8 | P.? | III - 14 | ? | | | 46 | 17 | 10 | ? |
| May 9 | M.p. | III - 6 | ? | | | 32 | | | juv. |
| May 10 | P.? | III - 15 | ? | 8.7 | 106 | 32 | 17 | 11 | juv. |
| May 10 | P.m.b. | III - 15 | ? | 17.2 | 144 | 56 | 18 | 14 | juv. |
| May 10 | P.m.b. | IV - 8 | ♂ | 17.7 | 137 | 52 | 17 | 13 | ad. |
| June 16 | Z.h. | III - 1 | ♀ | 18.4 | 197 | 116 | 29 | 15 | ad. |
| June 16 | Z.h. | III - 4 | ♀ | 25.3 | 185 | 117 | 29 | 15 | ad. |
| June 16 | P.m.b. | III - 11 | ♀ | 20.9 | 141 | 56 | 17 | 16 | ad. |
| June 17 | P.m.b. | III - 11 | ♂ | 16.6 | 132 | 50 | 18 | 14 | ad. |
| June 17 | P.m.b. | III - 17 | ? | 27.8 | 136 | 49 | 17 | 15 | ad. |
| June 17 | P.m.b. | III - 18 | ♀ | 19.4 | 133 | 50 | 16 | 13 | ad. |
| June 18 | Z.h. | III - 5 | ♀ | 18.2 | 202 | 117 | 29 | 16 | ad. |
| June 18 | Z.h. | III - 9 | ? | 17.4 | 209 | 122 | 29 | 16 | ad. |
| June 18 | P.m.b. | III - 20 | ? | 15.0 | 136 | 56 | 18 | 16 | ad. |
| June 18 | P.m.b. | III - 20 | ? | 14.0 | 123 | 57 | 18 | 13 | ad. |
| June 17 | P.m.b. | IV - 6 | ♀ | 16.9 | 121 | 56 | 18 | 16 | ad. |
| June 18 | P.m.b. | IV - 9 | | | | 62 | 18 | - | ad. |
| June 18 | P.m.b. | IV - 11 | ♂ | 14.6 | 145 | 53 | 17 | 13 | |
| June 18 | P.m.b. | IV - 8 | ♂ | 17.3 | 146 | 57 | 18 | 12 | |
| July 17 | T.s. | III - 2 | ? | | | | | | juv. |
| July 17 | P.l.n. | III - 13 | ♀ | 17.7 | 169 | 75 | 20 | 15 | juv. |
| July 15 | P.m.b. | IV - 4 | ♂ | 18.3 | 147 | 45 | 17 | 8 | ad. |
| July 15 | P.m.b. | IV - 5 | ♀ | 26.5 | 152 | 44 | 18 | 11 | ad. |
| July 15 | P.m.b. | IV - 10 | ♂ | 25.7 | 139 | 49 | 19 | 8 | ad. |

TABLE V - Data on Individuals Caught (continued)

| Date | Species | Location | Sex | Weight (gms.) | Total Length (mm.) | Tail | Hind Foot | Ear | Age |
|---|---|---|---|---|---|---|---|---|---|
| July 16 | P.m.b. | IV - 5 | ♀ | 26.8 | 137 | 43 | 16 | 8 | ad. |
| July 17 | P.? | IV - 9 | ? | 4.5 | 91 | 32 | 15 | 5 | ad. |
| July 17 | P.m.b. | IV - 5 | ♀ | 28.0 | 138 | 51 | 16 | 10 | ad. |
| Aug. 20 | Z.h. | III - 1 | ♂ | | 201 | 123 | 30 | 12 | ad. |
| Aug. 21 | Z.h. | III - 15 | ♂ | | 188 | 116 | 27 | 11 | ad. |
| Aug. 19 | P.m.b. | IV - 9 | ♂ | | 148 | 59 | 18 | 13 | ad. |
| May 22 | Z.h. | | ♂ | 17.3 | 197 | 114 | | | ad. |
| May 24 | M.p. | | ♀ | 15.4 | 99 | 20 | 17 | | juv. |
| May 27 | M.p. | | ♂ | 21.7 | 129 | 39 | 20 | 30 | ad. |
| June 16 | M.p. | | ♂ | 36.3 | 150 | 42 | 18 | 16 | ad. |
| June 16 | Z.h. | | ? | 24.3 | 205 | 123 | 30 | 15 | ad. |
| June 17 | P.m.b. | | ♀ | 15.7 | 128 | 57 | 19 | 12 | ad. |
| June 17 | Z.h. | | ♀ | 22.6 | 205 | 127 | 27 | 15 | ad. |
| June 17 | Z.h. | | ? | 21.3 | 190 | 113 | 29 | 15 | ad. |
| June 17 | Z.h. | | ? | 22.4 | 186 | 118 | | | ad. |
| June 18 | Z.h. | | ? | 18.0 | 206 | 121 | 28 | 13 | ad. |
| June 18 | Z.h. | | ? | 18.6 | 224 | 130 | 29 | 15 | ad. |
| June 18 | Z.h. | | ? | 17.3 | 203 | 120 | 27 | 14 | ad. |
| June 17 | P.m.b. | | ♂ | 11.7 | 126 | 50 | 16 | 11 | juv. |
| June 17 | P.m.b. | | ♂ | 11.7 | 137 | 62 | 18 | 13 | ad. |

* For abbreviations, see Table II.

# COMMERCIAL FISHERIES MANAGEMENT

by
A. H. Berst

Fisheries management is the regulation or control of the use of fish populations so that the greatest quantity may be taken each year without endangering the future production of the fishery.

There is a need for regulating the total annual catch according to the size of the population and the annual addition to the stock of fish through reproduction and growth. It is in the best interests of the conservation of the fishery to remove each year only the surplus stock, and to leave a sufficient number of spawners as well as immature age classes, to insure continued high production for the following years.

One of the greatest problems confronting fisheries managers is estimating the sizes of the populations, and deciding what proportion of the population can be considered "surplus". The best indicator we have at the present time for estimating the size of a population (as far as large bodies of water are concerned) is the relative availability of various species by fishing. In other words if availability by fishing is high for a certain species, we consider that that species is abundant. One limitation of this method is that, since, in the case of gill net fisheries, as a general rule only the fish which are large enough to be "gilled" appear in the fishery* and there is no indication of the abundance of young fish, upon which the future of the fishery will depend.

How many spawners must be left to insure adequate production? It was formerly thought that the more spawners that were left in the water, the greater would be the production. However, it has been shown that there is no necessary connection between the number of eggs produced in a particular spawning season and the number of fry which survive. Poor spawning years, as far as egg production is concerned, have at times been good brood years. It is considered that there is a critical period of great mortality which falls in the first few days or weeks after the eggs hatch. Factors which may influence the hatchery and survival of young fry include the following:

* In the case of pickerel, due to the nature of thin teeth, the fish "bridle" in the mesh, and large quantities of the young pickerel are caught in this manner.

(1) Rough water, caused by gales, stirs up the silt on the bottom, making the water very turbid. The food supply in the form of microscopic animals is largely killed off, as well as large numbers of newly-hatched fry.

(2) Strong water currents carry fry away from their natural habitat, into areas of deeper water, with radically different temperature conditions, which are often lethal to millions of fry.

(3) Even if ideal hydrographic condtions prevail at the time of the hatching of the eggs, resulting in good fry production, there would still be no assurance of a large survival if there were present, a heavy population of small predators, such as small pickerel or smelt, as often occurs in Lake Erie. Therefore, if there is a high population of small predators, in all probability they will depress the fingerling survival resulting from the hatches which are to follow, until the predators have attained a size at which they are no longer interested in consuming fingerlings, when it would again be possible to have a large fry and fingerling survival.

Effect of Fishing Pressure on Populations:

It has been demonstrated by biologists that any given body of water has a definite capacity for supporting a fish population. Generally speaking, the total amount of fish in the water will not vary appreciably from year to year, whether the water is fished or not.

Fish populations in waters which are not fished, are usually characterized by relatively small numbers of old, large fish, with slow growth rate. On the other hand, populations in heavily fished water are usually comprised of relatively large numbers of small fish with a fast growth rate.

Within limits, fishing is good for a stock since it removes the older, slow-growing individuals. Young fish take their place, pound for pound, with faster growth rates. Where the old individual consumed food which was used mainly for living, the young fish use a large part of the food for growing, and then the rate of production is increased.

Methods of Regulating Catch of Commercial Fish:

Since many of our waters are fished quite intensively, the tendency in managing a fish population, is usually to try to limit the annual removal of fish, rather than to attempt to increase it. It is felt that there is, in many cases, a danger of removing more than the "surplus" population in any one year.

There are two methods employed in controlling the total quantity of the catch. The first is by limiting the amount of nets fished, i.e. yardage of gill nets, and numbers of pound, trap or hoop nets. In the case of the gill net, the enforcement of the yardage regulation is made very difficult since gill nets may be set in different locations, and various "gangs" of nets are lifted at different times, making it practically impossible for the enforcement Officer to account for the yardage at any one time.

Another method of regulating the catch is by setting closed seasons for fishing, or, allowing fishing for only a certain number of months of the year. However, in current practice, the seasons are usually the same from year to year, and no adjustments are being made which are correlated with the changing sizes of the fish populations.

At present, the best "regulators" of annual catch are price and availability. When the fish population becomes small, the producer must put more and more effort into catching enough fish to meet expenses. When it costs more to catch a pound of fish than the producer is able to obtain on the market, he must quit fishing, and thereby give the population a chance of gaining in size.

There is also some control over the sizes of individuals which are caught, by the regulations on mesh sizes. However, with the nylon twine which is presently widely used, there is a great variation in the size of fish caught, which is due to the unusual qualities of the nylon material for catching fish.

In addition to having a regulation on the size of mesh, there are regulations governing the sizes of individuals of various species which may be taken. This regulation, however, is subject to a great deal of controversy since gill nets catch and kill large quantities of undersized fish, which at the present time would bring a very good price on the market, and yet, under the fisheries regulations they cannot be sold.

Research on Commercial Fisheries Populations:

Statistics:

Data on availability of commercial species in the Great Lakes by fishing are being accumulated by the Ontario Department of Lands & Forests by the compilation of catch records which are submitted on a daily basis by each licensed commercial fisherman. These records of availability for each commercial species may be totalled for each lake, by the month or by the year. They provide administrators with valuable information which can be used to follow the

progress of the populations of the various species in the lakes and act partly as a basis for the adjustment of the regulations which will control the harvest of fish.

Studies of Migration:

Movements of fish populations are often responsible for fluctuations in commercial catches. It has been found that fish migrate chiefly for two reasons; to search for new food supplies and to find suitable spawning grounds.

As a general rule, the migrations of a fish population follow a similar pattern from year to year. They move against the current, to certain spawning grounds and after the eggs hatch, the young fish are carried down current to the feeding grounds from whence came their parents.

The best method of studying the movements which has been devised thus far, is by tagging large numbers of individuals, and recording the time and place of release. Records of the recovery of tagged individuals are kept. Finally after sufficient returns have been recorded and their locations charted, the story of the migration is unfolded.

Age Determination:

Methods have been developed by which the age of a fish can be determined from a microscopic examination of scales. In addition to aging an individual, the study of the scales may also reveal the growth rate history of the fish for each year of its life.

This information is very valuable to the manager, as it reveals the situation respecting the food supply. When there is ample food, the growth rate is normal, but when the population becomes overcrowded, there often is insufficient food to satisfy the requirements of the population, resulting in stunted individuals. The corrective measure in this case, would probably be to increase the fishing pressure to bring the population to a level commensurate with the stocks of food available.

The Value of Research in Management:

Knowledge of the status of various species and of the chief factors affecting their survival enables managers to predict the sizes of the populations and the availability of those species for one or more years ahead. Accurate forecasts of this type are very helpful to the

fishermen, who are able to make proper arrangements ahead of time insofar as boats, nets and other gear required in the fishery are concerned.

The ultimate goal of managers is to provide a management program based on adequate, accurate research on the fishery, which will result in maximum annual production, thereby giving stability to the resource and more security to those who depend upon it for their livelihood.

# A BIOLOGICAL SURVEY OF BOUNDARY LAKE

## CONGER TOWNSHIP, PARRY SOUND

by
F. A. Walden

(Parry Sound Forest District Biological
Studies No. 5, 1952)

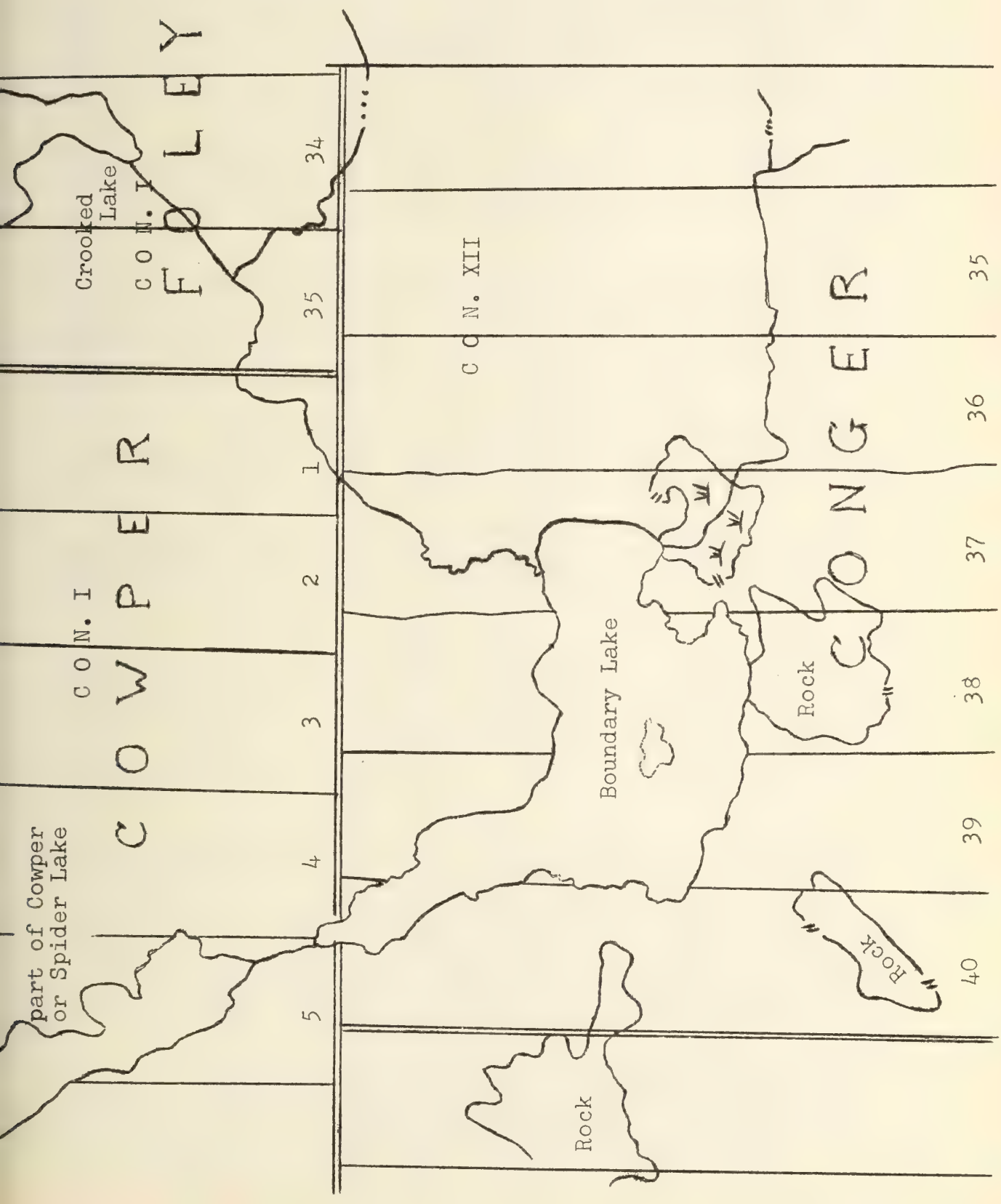
In April of 1951, a request (Powell, 1951) was made of the Department of Lands and Forests for permission to stock yellow pike-perch in Boundary Lake, Township of Conger. Since the only game fish occurring naturally in the Lake is the smallmouth bass, a survey of the Lake was planned and executed. The results of the survey constitute this report.

Boundary Lake, Latitude 45°13' N., Longitude 80°01' W., lies in Concessions XI and XII, Lots 36 to 40 of the Township of Conger, in the Territorial District of Parry Sound, (Figure 1). It may be reached most readily by air, being nine air-miles from the Town of Parry Sound. It is accessible also by boat from Georgian Bay, through Cowper (Spider) Lake, though two portages are involved. A rough trail, through the bush, much of which is suitable only for travel by horse, leads to No. 69 Highway, approximately 12 miles from the Lake.

The survey was conducted by the District Biologist on October 24th and 25th, 1951. Equipment was flown in, and the assistance of one man was obtained at the Lake. Test-fishing with gill nets and a minnow seine was conducted and a contour map constructed. Other biological observations were made.

There is one summer cottage and hunting camp on the Lake, and this, combined with the few sportsmen who may come in from Cowper Lake and Georgian Bay suggests the degree of exploitation of the fishery. Since the Lake is not readily accessible and the number of sportsmen visiting it is small, it is not of great importance as a fishing water. Notwithstanding, the development of the fishing is to be regarded as an integral part of the overall fish management plan for Parry Sound Forest District.

FIGURE I - Outline Map Showing Location and Drainage of Boundary Lake, Conger Township - District of Parry Sound.



Physical Characteristics

The lake lies in a depression between ridges of Pre-Cambrian rocks. The basin, as may be seen from the contour map (Figure 2) is of simple form, with three bays projecting from it. The surface area is 145 acres (0.23 square miles) and the shoreline length measured from a map was found to be approximately four miles, including that of the island. This gives a shore development of 3.3 which is considered a moderate value.

The main axis of the lake lies in a northwest-southeast direction. The maximum depth found was about 47 feet (13 meters) and the average depth has been calculated and found to be 25 feet.

The bay of the northeast portion of the lake is shallow, its greatest depth being 17 feet. The northwest bay is deeper, averaging 20 feet in depth and having a small depression close to its extremity which is 30 feet deep. Generally, the drop-off is steep, correlated to some degree with the rocky and rugged shores.

The bottom was found to be mud and rock, though there are sand beaches along the north shore. The bottom of the northeast bay is sand.

The colour of the water is brownish. The transparency, measured with Secchi's Disc was found to be 2.5 meters (8 feet). Due to heavy rains, the water was thought to be rather more turbid than normal.

The drainage basin comprises an area of 4.7 square miles. It is covered with second growth hardwood, with some softwoods, chiefly white pine. There is a very limited amount of merchantable timber. There are some areas of bare rock. For the most part, the forest extends to the water's edge and there is little differentiation of typical marginal vegetation.

The map shows two tributary streams, flowing into the northeast bay. The one on the northerly side of the bay is the more important and during the freshet or time of heavy rains, it has a moderately large volume. The stream shown as coming in on the southerly side of the bay is apparently a sluggish backwater from the lake, extending into a valley between the rocky ridges. Much of the area of this valley is boggy. The main inlet stream would appear to be adequate for spawning pickerel.

There is one outlet, a straight and rather precipitous water course, about 150 yards in length, which drains the lake directly into Cowper Lake. The fall from Boundary Lake to Cowper Lake is estimated to be about 40 feet.

FIGURE II - Outline Map of Boundary Lake, Conger Township Showing Ten Foot Contours and Gillnet Sets N1, N2 and N3. Scale: 4 inches to 1 mile. North is Toward the Top of the Page.

Little is known of the thermal and chemical characteristics of the lake. Since the survey was conducted late in the season, it was believed that thermal stratification would no longer be apparent. The surface temperature on September 26th was found to be 50°F and the surface pH was 6.1 units.

Biological Characteristics

Samples of the fish population were procured by use of a series of gill nets of varying mesh sizes. The location of the nets is shown on the outline map (Figure 2). The specifications of each gang of nets and their catch are given in Table I.

Table I - Set #1

| Mesh Size: | 2½" | 4½" | 4" (old) | 4" (new) |
|---|---|---|---|---|
| Length of Net: | 140' | 140' | 115' | 180' |
| Depth of Set: | 12' 20' | 17' 20' | 20' | |
| Catch: | 13 perch, 3 rock bass | 4 white suckers | 5 white suckers | 2 white suckers |

- Set #2

| Mesh Size: | 2" | 2¾" | 3½" |
|---|---|---|---|
| Length of Net: | 115' | 130' | 140' |
| Depth of Set: | 5' 40' | 43' | 43' |
| Catch: | 35 ciscos, 5 perch | 47 ciscos, 2 perch | 1 white sucker, 1 cisco |

- Set #3

| Mesh Size: | 1½" | 3½" |
|---|---|---|
| Length of Net: | 75' | 140' |
| Depth of Set: | Shore 36' | 36' |
| Catch: | Nil | Nil |

The catch of fish is summarized by species in Table II.

TABLE II - Net Catch by Species - Boundary Lake - 1951.

| Species | Number | Size Range (inches) |
|---|---|---|
| Cisco | 83 | 7.5 - 9.6 |
| White Sucker | 12 | 13.6 - 17.0 |
| Perch | 20 | 6.9 - 10.9 |
| Rock Bass | 3 | 5.8 - 6.4 |

Although the smallmouth bass is reported to be the only game fish present, no specimens were taken. The cisco was dominant in the catch, with the perch ranking second.

This does not give a true picture of the relative importance of each species in the lake. It may give a fair idea of the relative populations of ciscos, white suckers and perch, since experience has shown that these three species are roughly equally catchable. The smallmouth bass is not easily caught in gill nets.

Age and Growth of Fish

The age of each fish specimen taken was determined by the scale method, and the combined data for each of three species are given in Tables III, IV and V. These data are for fish collected late in the year.

TABLE III - Age and Growth of the Cisco in Boundary Lake - 1951.

| Age Class | Sex | No. | Fork Length (ins.) Range | Fork Length (ins.) Mean | Standard Length (mm.) Range | Standard Length (mm.) Mean |
|---|---|---|---|---|---|---|
| II | ♂ | 40 | 7.5 - 9.0 | 8.44 | 178 - 211 | 196.4 |
| | ♀ | 29 | 7.6 - 9.2 | 8.25 | 178 - 216 | 192.5 |
| III | ♂ | 11 | 8.3 - 9.6 | 8.85 | 193 - 224 | 205.0 |
| | ♀ | 1 | - | 8.8 | - | 206 |

The rate of growth of the cisco has been compared with data (Carlander, 1950) from other waters, and up to their second year, Boundary Lake ciscos show an excellent growth rate. In their third year, growth appears to have slowed down considerably.

TABLE IV - Age and Growth of the Yellow Perch in Boundary Lake - 1951.

| Age Class | No. | Fork Length (ins.) Range | Fork Length (ins.) Mean | Standard Length (mm.) Range | Standard Length (mm.) Mean |
|---|---|---|---|---|---|
| III | 3 | 6.9 - 8.3 | 7.57 | 152 - 185 | 169 |
| IV | 10 | 8.3 - 9.8 | 9.01 | 188 - 221 | 202.5 |
| V | 3 | 9.0 - 9.8 | 9.47 | 203 - 223 | 214.7 |
| VI | 3 | 9.3 - 10.9 | 10.37 | 206 - 244 | 231.3 |
| VII | 1 | - | 9.3 | - | 211 |

The yellow perch show a good growth rate throughout the range of the year classes given. Little reliance was placed on the scant data for year class VII.

TABLE V - Age and Growth of the White Sucker in Boundary Lake - 1951.

| Age Class | No. | Fork Length (ins.) Range | Fork Length (ins.) Mean | Standard Length (ins.) Range | Standard Length (ins.) Mean |
|---|---|---|---|---|---|
| III | 1 | - | 13.6 | - | 312 |
| V | 5 | 15.5 - 17.0 | 16.0 | 356 - 394 | 369.2 |
| VI | 6 | 15.3 - 17.0 | 16.1 | 350 - 394 | 368.5 |

The numbers of suckers are rather too few for comparison though the indications are that their growth rate is about average.

Fecundity and Reproduction of the Cisco

Virtually all of the ciscos captured were ready to spawn. Milt was exuded from many of the male fish, and eggs from some of the females. Egg counts were made for some of the females and these data along with information concerning the size of the individual fish are given in Table VI. It is possible that some eggs had been discharged at the time the fish were captured. Accordingly, some or all of the egg counts may be low. The information will at least give an idea of the minimum number of eggs laid.

TABLE VI - Number of Eggs Taken from Ciscos, Compared With Body Size of Fish.

| Fish No. | Fork Length (inches) | Weight (ozs) | No. of Eggs | No. of Eggs/ Ounce of Fish |
|---|---|---|---|---|
| 65 | 8.6 | 4.0 | 5756 | 1439 |
| 69 | 9.2 | 3.75 | 2807 | 750 |
| 70 | 8.7 | 3.5 | 3875 | 1106 |
| 73 | 8.6 | 4.0 | 5635 | 1409 |
| 77 | 8.0 | 3.25 | 4000 | 1229 |
| 79 | 7.6 | 3.0 | 3400 | 1133 |
| - | | | 4050 | - |
| - | | | 2800 | - |

The data suggests that Cisco #69 had almost certainly lost some of its eggs. Deleting this from the calculation, it is found that the average number of eggs per ounce of cisco is 1263. It will be noted that the fish are spawning at the end of their third summer (Age Class II fish). It is not known whether this is the first time they have spawned since no fish of Age Class I were captured.

No special study of plankton or bottom fauna was made. It is significant though that the cisco, a plankton-feeder and the perch, which is a bottom-feeder were the most abundant in the net catch, and that their rate of growth appears favourable.

Perch, of course, feed to a large extent on insects. The smallmouth black bass, according to reports is limited in size and numbers. Lack of feed, particularly crayfish, may be the explanation.

An effort was made to evaluate the fish food, in terms of the minnow population. No minnows were seen anywhere in the lake and attempts to take them in a seine were unsuccessful. A few small sunfish were captured.

## Discussion

The native species of game fish is the smallmouth black bass, though fishing is said to be poor. Ciscos and perch occur but it is unlikely that the bass utilize the ciscos for food to a degree consistent with the numbers available. Food appears to be limited for smallmouth black bass, but quite adequate for perch and for ciscos in their first two years.

The introduction of an additional game species seems justified and it is believed that the yellow pike-perch or pickerel would be the species most likely to succeed. Since they frequent deeper water than bass, they would have an opportunity to utilize the ciscos for food and the inlet stream would appear to provide suitable spawning grounds.

The limited success enjoyed by the smallmouth black bass is a matter for speculation. The best spawning grounds for bass appear to be close to the outlet, and in the neighbourhood of the one island and the point of mainland nearest it. Spawning escapement is probably not a factor in controlling the numbers of bass. Food production may be a limiting factor since much of the bottom is sandy or muddy. The rocky or shingle bottom, on which bass frequently forage, is not very extensive, and the supply of crayfish may be low as a consequence.

## Conclusions

Boundary Lake is an acid-water, oligotrophic lake, lying in a depression in Pre-Cambrian rocks. It has an area of 145 acres and an average depth of 25 feet. The maximum depth is 47 feet.

The fish fauna includes the cisco, white sucker, yellow perch, pumpkinseed sunfish, rock bass and smallmouth black bass. The fishing for the smallmouth black bass is said to be poor, and it is believed that this may be due to limited production of suitable food, rather than insufficient spawning escapement. It is believed that yellow pikeperch or pickerel could be successfully introduced and that they would utilize the ciscos and perch for food. The inlet stream appears to provide a suitable spawning area for the yellow pikeperch.

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# SUMMARY OF FUR RETURNS BY ONTARIO GAME MANAGEMENT DISTRICTS

COMPILED FROM DISTRICTS FORM G-224 FOR YEAR 1954-55

| DISTRICT | | NO. OF AREAS | NO. OF TRAP. | RETS MADE | RETS MISS. | BEAVER QUOTA | FIS. QUO. | MAR. QUO. | BEAVER CATCH | BOB CAT | FIS. | ARC. FOX | COL. FOX | LYNX | MAR. | MINK | MUSKRAT | OTT. | RAC. | SKUNK | SQUIR. | WEASEL | BR WOL. | TIM WOL. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHAPLEAU | RTA | 123 | 99 | 97 | 0.0 | 4230 | 528 | 668 | 2680 | — | 157 | — | 15 | 37 | 253 | 425 | 2300 | 137 | — | — | — | 415 | — | — |
| COCHRANE | RTA | 67 | 75 | 74 | 1.0 | 2432 | 348 | 344 | 1837 | — | 167 | 1 | 34 | 44 | 180 | 407 | 1778 | 44 | 1 | — | 28 | 497 | — | — |
| " | RES | — | 23 | 23 | 0.0 | 137 | — | — | 90 | — | 2 | — | — | 1 | 2 | 7 | 512 | — | — | — | 6 | 41 | — | — |
| FORT FRANCES | RTA | 121 | 120 | 111 | 7.5 | 9116 | 283 | 33 | 6214 | 4 | 144 | — | 15 | 7 | 11 | 910 | 5719 | 84 | — | — | 1035 | 594 | 6 | 9 |
| " | RES | — | 114 | 45 | 60.5 | 1490 | — | — | 691 | 5 | 1 | — | 28 | — | — | 92 | 2034 | 3 | — | — | 87 | 256 | 8 | — |
| GERALDTON | RTA | 118 | 124 | 124 | 0.0 | 7342 | 334 | 1004 | 3406 | — | 110 | — | 38 | 62 | 545 | 382 | 855 | 121 | — | — | 91 | 464 | — | — |
| GOGAMA | RTA | 119 | 110 | 101 | 8.2 | 3156 | 340 | 385 | 2083 | — | 146 | — | 26 | 16 | 260 | 471 | 2124 | 126 | — | — | 237 | 499 | 19 | 1 |
| KAPUSKASING | RTA | 100 | 100 | 82 | 18.0 | 6500 | 410 | 808 | 3913 | — | 167 | 1 | 15 | 98 | 717 | 370 | 2022 | 188 | — | — | 77 | 1125 | — | — |
| " | RES | — | 40 | 40 | 0.0 | 80 | — | — | 111 | — | 8 | — | — | 37 | 5 | 11 | 106 | — | — | — | — | — | — | — |
| KENORA | RTA | 274 | 353 | 281 | 20.4 | 12195 | 343 | — | 6205 | 18 | 119 | — | 31 | 9 | 1 | 1381 | 13745 | 68 | — | 32 | 1824 | 818 | 2 | 38 |
| " | RES | — | 28 | 3 | 89.3 | — | — | — | 26 | — | — | — | — | — | — | — | 2 | — | — | — | — | 2 | — | 2 |
| LAKE ERIE | RTA | 64 | 64 | 64 | 0.0 | — | — | — | — | — | — | — | 2 | — | — | 151 | 85017 | — | 51 | 2 | — | 14 | — | — |
| " | RES | — | 1055 | 1043 | 1.1 | — | — | — | 9 | — | — | — | 288 | — | — | 545 | 86222 | — | 3474 | 1019 | — | 352 | 3 | — |
| " | FAR | — | — | 168 | — | — | — | — | — | — | — | — | — | — | — | 14 | 3336 | — | 20 | 25 | — | 10 | — | — |
| LAKE HURON | RES | — | 1048 | 1044 | 0.4 | — | — | — | 2 | — | — | — | 289 | — | — | 1468 | 63609 | 2 | 3810 | 472 | 137 | 504 | 3 | — |
| " | FAR | — | — | 300 | — | — | — | — | — | — | — | — | 33 | — | — | 48 | 3032 | — | 181 | 36 | 2 | 46 | — | — |
| LAKE SIMCOE | RTA | 23 | 23 | 23 | 0.0 | 614 | — | — | 524 | — | — | — | 16 | — | — | 149 | 2384 | 19 | 56 | 5 | 25 | 25 | 6 | — |
| " | RES | — | 482 | 475 | 1.5 | — | — | — | 495 | — | — | — | 493 | — | — | 807 | 42429 | 24 | 1054 | 194 | 159 | 173 | 13 | 5 |
| " | FAR | — | — | 22 | — | — | — | — | — | — | — | — | — | — | — | 3 | 713 | — | — | — | — | — | — | — |
| LINDSAY | RTA | 128 | 146 | 142 | 2.7 | 3792 | 96 | 21 | 3590 | — | 27 | — | 32 | — | 17 | 492 | 7995 | 82 | 93 | — | 58 | 130 | — | 5 |
| " | RES | — | 648 | 503 | 22.4 | 2358 | — | — | 2097 | — | 3 | — | 199 | — | — | 530 | 27597 | 40 | 321 | 34 | 100 | 107 | 7 | 4 |
| NORTH BAY | RTA | 152 | 165 | 155 | 6.1 | 4734 | 55 | 1 | 3222 | — | 35 | — | 73 | 5 | 5 | 896 | 4232 | 124 | 7 | 10 | — | 487 | 4 | 14 |
| PARRY SOUND | RTA | 138 | 134 | 118 | 11.4 | 4459 | 394 | 218 | 3292 | — | 108 | — | 45 | — | 129 | 670 | 5110 | 143 | 41 | 3 | 107 | 393 | — | 25 |
| " | RES | — | 463 | 339 | 26.8 | — | — | — | 2261 | — | 4 | — | 66 | — | 2 | 866 | 9734 | 78 | 175 | 3 | 370 | 437 | 15 | — |
| PATRICIA CENTRAL | RTA | 276 | 807 | 700 | 13.3 | 32166 | 290 | 186 | 14732 | — | 86 | 11 | 160 | 245 | 153 | 6178 | 18612 | 2360 | — | — | 5325 | 6837 | — | 47 |
| PATRICIA EAST | RTA | 233 | 442 | 418 | 5.5 | 20889 | 398 | 903 | 9644 | — | 138 | 84 | 205 | 390 | 490 | 2875 | 9935 | 802 | — | 15 | 770 | 4683 | — | — |
| PATRICIA WEST | RTA | 308 | 855 | 649 | 24.1 | 25787 | 1131 | 138 | 10356 | — | 466 | 1 | 228 | 275 | 5 | 2781 | 26942 | 705 | — | — | 4851 | 5777 | 27 | 41 |
| PEMBROKE | RTA | 62 | 62 | 62 | 0.0 | 3066 | 331 | 137 | 2419 | — | 153 | — | 22 | — | 78 | 468 | 4851 | 107 | 23 | — | — | 205 | — | 3 |
| " | RES | — | 59 | 59 | 0.0 | — | — | — | 359 | — | 4 | — | 18 | — | 6 | 91 | 2740 | 3 | 8 | — | 23 | 12 | — | — |
| " | FAR | — | — | 5 | — | — | — | — | — | — | — | — | — | — | — | 1 | 143 | — | — | — | — | — | — | — |
| PORT ARTHUR | RTA | 193 | 233 | 233 | 0.0 | 8944 | 1021 | 575 | 6712 | 9 | 246 | — | 38 | 28 | 109 | 565 | 3209 | 173 | — | — | 203 | 922 | 7 | 28 |
| " | RES | — | 58 | 45 | 22.5 | — | — | — | 312 | — | — | — | — | — | — | 5 | 243 | 2 | — | — | — | 25 | — | — |
| RIDEAU | RES | — | 907 | 886 | 2.3 | — | — | — | 565 | — | — | — | 182 | — | — | 346 | 70063 | 7 | 73 | 8 | 29 | 184 | — | — |
| " | FAR | — | 393 | 316 | 19.6 | — | — | — | 2 | — | — | — | 32 | — | — | — | 9267 | 1 | 104 | 5 | — | 28 | — | — |
| SAULT STE. MARIE | RTA | 260 | 236 | 236 | 0.0 | 10444 | 570 | 160 | 3343 | 3 | 162 | — | 12 | 24 | 70 | 1087 | 2111 | 170 | — | 13 | 150 | 828 | 2 | 32 |
| " | RES | — | 87 | 87 | 0.0 | 820 | — | — | 417 | — | 3 | — | 25 | — | 1 | 165 | 1809 | 5 | — | — | 24 | 81 | 5 | 2 |
| SIOUX LOOKOUT | RTA | 89 | 113 | 93 | 17.7 | 5002 | 316 | 434 | 2106 | 3 | 77 | — | 5 | 55 | 81 | 386 | 1951 | 66 | — | — | — | 441 | — | — |
| SUDBURY | RTA | 212 | 206 | 179 | 13.1 | 14039 | 97 | 62 | 5949 | 2 | 72 | — | 29 | 14 | — | 1180 | 5596 | 163 | 6 | 1 | 58 | 772 | 4 | 21 |
| " | RES | — | 141 | 131 | 7.1 | — | — | — | 1022 | — | — | — | 18 | 22 | — | 256 | 2060 | — | 1 | — | 11 | 124 | 38 | — |
| SWASTIKA | RTA | 141 | 159 | 159 | 0.0 | 4147 | 280 | 7 | 3042 | — | 145 | — | 29 | 56 | 7 | 383 | 3477 | 75 | — | — | 60 | 485 | — | 11 |
| " | RES | — | 12 | 12 | 0.0 | 39 | — | — | 25 | — | 1 | — | 1 | 4 | — | 4 | 141 | — | — | — | 3 | 11 | — | — |
| | FAR | — | — | 24 | — | — | — | — | — | 1 | 4 | — | — | 8 | — | 25 | 160 | 2 | — | — | — | — | — | 2 |
| TWEED | RTA | 185 | 184 | 178 | 3.3 | 7270 | 26 | — | 3552 | — | 15 | — | 19 | — | — | 433 | 15115 | 46 | 64 | — | 40 | 98 | 5 | 5 |
| " | RES | — | 1241 | 1187 | 4.4 | 6523 | — | — | 3950 | — | — | — | 107 | — | — | 653 | 85354 | 56 | 79 | 2 | 239 | 295 | 8 | 2 |
| " | FAR | — | — | 63 | — | — | — | — | — | — | — | — | — | — | — | 13 | 3671 | — | — | — | — | 6 | — | — |
| WHITE RIVER | RTA | 141 | 119 | 119 | 0.0 | 7147 | 472 | 657 | 4184 | 1 | 145 | — | 11 | 64 | 460 | 530 | 808 | 198 | — | — | 4 | 438 | 18 | 4 |
| TOTALS | | 3528 | 12310 | 11218 | | 208918 | 8063 | 6741 | 115439 | 46 | 2915 | 98 | 2879 | 1501 | 3587 | 29520 | 640865 | 6224 | 9641 | 1879 | 16133 | 28813 | 200 | 301 |

RTA REGISTERED TRAPLINE AREAS 4929 RTA TRAPPERS 10.8 PER. RTA TRAPPERS RETURNS MISSING 55.2 PER. OF BEAVER QUOTA CAUGHT

RES RESIDENT TRAPPING LICENSES 6406 RES " 7.6 " RES " " " 36.2 " FISHER " "

FAR FARMER TRAPPER 975 FAR " — " FAR " " " 53.2 " MARTEN " "

# I N D E X T O
# FISH AND WILDLIFE MANAGEMENT REPORTS
# JULY, 1951 - DECEMBER, 1955
# NUMBERS 1 - 26

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